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Five Species of Marine Nematodes of the Genus *Chromadora* Bastian from Japan*

With 5 Text-figures

Kenji KITO

Zoological Institute, Hokkaido University, Sapporo, Hokkaido 060, Japan

ABSTRACT Five species of the genus *Chromadora*, of which two are new to science and the other three already known from Japan, are reported from some Japanese coasts. Their distribution within Japan is summarized and some useful characters to distinguish them are discussed. A key to the species of the genus is also given.

The present paper deals with a result of my faunistic study of marine nematodes, especially of the genus *Chromadora* Bastian (Family Chromadoridae), in Japan. Up to the present, *C. nudicapitata* Bastian, 1865, *C. macrolaimoides* Steiner, 1915, and *C. brevipapillata* Micoletzky, 1924, have been recorded from Shirahama (Wieser, 1955) and *C. nudicapitata* and *C. heterostomata* Kito, 1978, have been reported from Oshoro (Kito, 1978). In the present paper, a new species is described from Shirahama, and *C. brevipapillata* previously reported by Wieser (1955) is redescribed as a new subspecies. Since some useful characters have become clear during the present study, they are discussed together with the knowledge of their distribution within Japan, and a key to the species of the genus is also proposed.

The specimens were selected from some samples of algal rinsings collected at Oshoro, on the Japan Sea coast of Hokkaido, Akkeshi and Muroran, both on the Pacific coast of Hokkaido, Misaki and Shirahama, both on the Pacific coast of Honshu, Tomioka, Amakusa, on the East China Sea coast of Kyushu, and Kuroshima in the Yaeyama Group, Ryukyu Islands (Fig. 4). The type-series are deposited in the Zoological Institute, Faculty of Science, Hokkaido University.

Abbreviations. L=body length; eso =esophagus length; hd=head diameter at the level of cephalic setae; bd=body diameter at the base of esophagus; ad= anal (cloacal) body diameter; vd=body diameter at the level of vulva; mbd=

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maximum body diameter; cs=length of cephalic setae; ps=distance of pigment spots from anterior; nr=distance of nerve ring from anterior; ep=distance of excretory pore from anterior; vg=distance of the posterior end of ventral gland from anterior; t=tail length; spic=spicule length, measured along the median line and the length of chord in parentheses; gub=gubernaculum length, measured along the median line; v=distance of vulva from anterior. All measurements are in micra.

Chromadora brevipapillata Micoletzky ***japonica*** n. subsp.

(Fig. 1)

Chromadora brevipapillata Micoletzky: Wieser, 1955, p. 169, fig. 6 a–c.

Measurements.

Males (holotype and 4 paratypes): L=798; 776; 784; 793; 880, eso=128; 125; 123; 121; 136, hd=12; 12; 13; 12; 13, bd=26; 29; 26; 26; 27, ad=25; 25; 27; 27; 27, mbd=27; 37; 29; 31; 32, cs=8; 8; —; 8; —, ps=21; 22; 21; 22; 23, nr=74; 74; 69; 68; 78, ep=25; 27; 23; 26; 31, vg=195; 193; 180; 185; 205, t=89; 92; 93; 97; 93, spic=23(19); 24(22); 23(21); 23(21); 22(20), gub=25; 24; 25; 25; 22.

Females (allotype and 4 paratypes): L=833; 781; 800; 806; 866, eso=138; 127; 131; 137; 140, hd=13; 12; 13; 13; 12, bd=32; 29; 34; 29; 30, ad=22; 22; 23; 24; 23, vd=37; 34; 43; 34; 41, mbd=41; 38; 43; 38; 41, cs=8; —; 9; 9; 10, ps=24; 22; 24; 24; 23, nr=72; 70; 75; 80; 79, ep=27; 25; 30; 28; 28, vg=203; 187; 194; 200; 213, t=103; 104; 99; 102; 108, v=411; 371; 393; 399; 410.

Male. Cuticle finely annulated, with transverse rows of punctations; four longitudinal rows very pronounced on lateral sides except for some of anterior portion and near tail end; ventral and dorsal punctations faint. Short setae sublaterally arranged.

Head (Fig. 1–2) truncated, cephalic setae about 0.7 head diameter long. Amphids loop-shaped, 4.0 μ wide. Pigment spots distinct, spreading rearward. Cervical setae present at both sides of pigment spots; two setae subventrally, three setae subdorsally, the posteriormost one being the shortest. Buccal armature rather stout; one dorsal and two subventral teeth present. Esophagus bulb (Fig. 1–1) oval, 35×21 μ; two constrictions present, the posterior one well developed. Nerve ring near three-fifths length of esophagus from anterior. Excretory pore opening near pigment spots but not before them; ventral gland slender.

Reproductive system with a single outstretched testis, 447 μ from anterior end of testis to cloaca. Spicules (Fig. 1–4) with slight proximal cephalization, proximal third rather straight and following part bending. Gubernaculum longer than spicules; dorsal piece remarkably cuticularized, distal part with a characteristic lateral expansion and distal end minutely serrated. Preanal supplements large and distinct, 3.7×4.0 μ, two in number; distance between two supplements as long as that between the posterior one and cloaca, 32 μ.

Tail (Fig. 1–3) plumped and stout, 3.6 anal body diameter long. Spinneret long

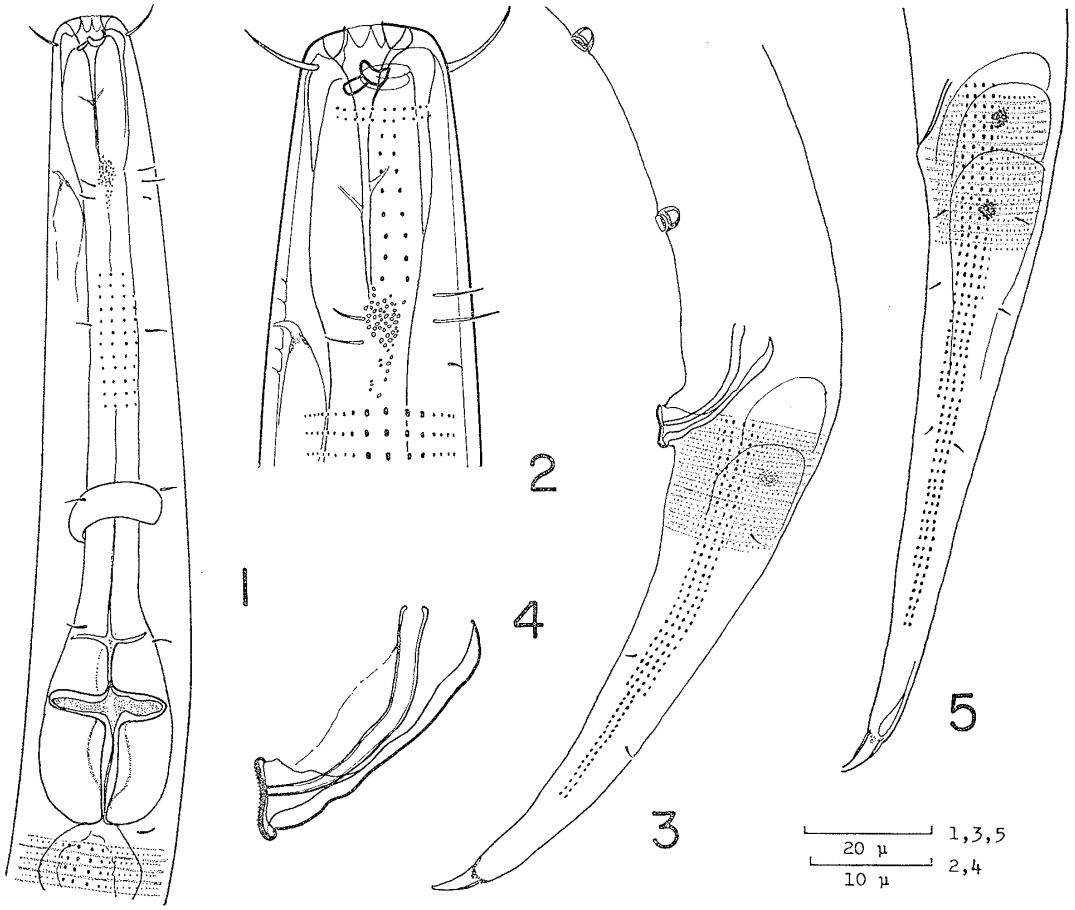

Fig. 1. *Chromadora brevipapillata japonica* n. subsp. Male (Holotype). —— 1. Anterior end. —— 2. Head. —— 3. Posterior end. —— 4. Spicules and gubernaculum. —— 5. Female (Allotype). Tail.

and distally bent, 8 μ.

Female. Reproductive system with paired, opposed and reflexed ovaries; the anterior reflexed at 129 μ, the posterior at 94 μ before and after vulva. Vulva slightly before middle of body. Egg absent.

Tail (Fig. 1–5) slimmer and longer than male, 4.7 anal body diameter long. Spinneret 8 μ.

Variation. Esophagus bulb sometimes pyriform in paratypes. Preanal supplements two in number in all males but distance between two supplements rather shorter than that between the posterior one and cloaca; the former 20–32 μ, the latter 25–32 μ. The anterior and posterior ovaries reflexed at about 18% of body length at maximum before and after vulva. Eggs 36–44×27–30 μ, one each uterus in paratypes. Spinneret 7–9 μ, and sometimes not bent ventrally.

Remarks. Chromadora brevipapillata Micoletzky is characterized by the following structures; two somewhat weak preanal supplements, the spicules with

the proximal portion shorter than the distal one, the gubernaculum normally shorter than the spicules and with distinctively dilated distal end, the shorter and plumper tail, and the long and distally bending spinneret (cf. the descriptions and figures by Stekhoven, 1943; Wieser, 1955 and 1956; Allgen, 1947, as *C. paramacrolaimoides*). The present material well accords with most of the above features, but is discernible from *C. brevipapillata* from the Red Sea, the Mediterranean and the Lesser Antilles, in two characteristics as follows; the large and distinct shape of the preanal supplement and the gubernaculum longer than the spicules in the male. From these morphological differences as well as from the geographical isolation, the present material is here reported as a new subspecies of *C. brevipapillata.*

Although Wieser (1955) previously reported *C. brevipapillata,* based upon only one female from Shirahama, together with *C. nudicapitata* and *C. macrolaimoides,* the former species was not collected in the present investigation. In the same locality, Shirahama, however, a closely related species, which is described as a new species later, was collected. On the other hand, *C. brevipapillata japonica* was found in Kuroshima and Tomioka but not in Shirahama. Therefore, his specimen seems to belong to either the present subspecies of *C. brevipapillata* or the following new species. Since it can be supposed from his statement, "other characters as in *C. macrolaimoides*", that the excretory pore of his specimen was situated near the pigment spots as in the case of the present subspecies, his specimen of *C. brevipapillata* is probably of the present subspecies.

Material studied. 8 males and 11 females. 7 ♂♂ and 7 ♀♀ (23–XI–1977) as type-series: Kuroshima, among algae on the coral reef flat; 1 ♂ and 4 ♀♀ (5–XII–1977): Tomioka, among algae including *Sargassum.*

Chromadora yamadai n. sp.

(Fig. 2)

Measurements.

Males (holotype and 4 paratypes): L=763; 746; 803; 822; 881, eso=124; 132; 130; 131; 132, hd=12; 12; 13; 13; 13, bd=29; 29; 33; 27; 29, ad=26; 25; 29; 28; 27, mbd=33; 31; 42; 31; 37, cs=10; 8; 7; 10; 9, ps=22; 25; 20; 22; 23, nr=68; 74; 74; 74; 71, ep=50; 48; 49; 48; 49, vg=182; 194; 193; 199; 207, t=94; 86; 88; 90; 93, spic=25(23); 25(22); 26(22); 26(23); 26(23), gub=21; 22; 23; 23; 25.

Females (allotype and 4 paratypes): L=843; 814; 856; 863; 867, eso=134; 137; 140; 139; 134, hd=13; 13; 13; 13; 13, bd=29; 31; 29; 35; 37, ad=23; 24; 22; 26; 29, vd (=mbd)=40; 39; 35; 47; 45, cs=8; 8; 9; 8; 9, ps=23; 24; 28; 24; 24, nr=76; 75; 81; 81; 76, ep=52; 50; 59; 55; 53, vg=205; 211; 209; 209; 212, t=107; 101; 106; 112; 108, v=408; 406; 414; 417; 419.

Male. Body and cuticular appearance identical with those of *C. brevipapillata japonica.*

Head (Fig. 2–2) truncated, and cephalic setae 0.8 head diameter long. Amphids loop-shaped, 4.2 μ wide. Pigment spots well developed. Buccal arma-

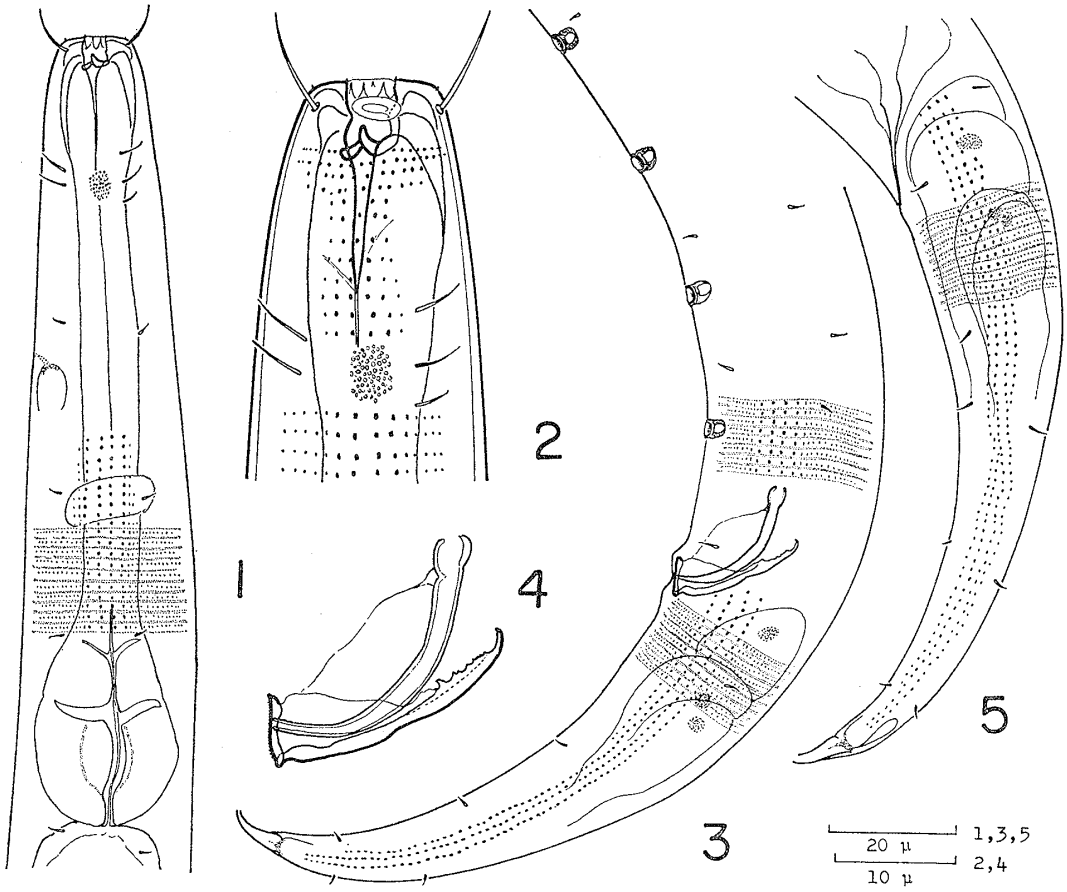

Fig. 2. *Chromadora yamadai* n. sp. Male (Holotype). —— 1. Anterior end. —— 2. Head. —— 3. Posterior end. —— 4. Spicules and gubernaculum. —— 5. Female (Allotype). Tail.

ture rather stout; one dorsal and two subventral teeth subequal. Esophagus bulb (Fig. 2–1) oval, 35×23 μ; two constrictions present, the posterior one well developed. Excretory pore opening far posterior to pigment spots; ventral gland slender.

Reproductive system with a single outstretched testis, 433 μ from anterior end of testis to cloaca. Spicules (Fig. 2–4) proximally cephalized and gradually tapering towards distal end; alae indistinct. Gubernaculum heavily cuticularized, slightly shorter than spicules; proximal half narrow and ventrally jagged, distal part with characteristic lateral expansion, distal end minutely serrated. Preanal supplements (Fig. 2–3) distinct, 3.1×3.3 μ, four in number; distance between the anteriormost and second, the second and third, the third and fourth, the fourth and cloaca, 25, 22, 24, 24 μ long, respectively.

Tail (Fig. 2–3) plumped and gradually tapering, 3.6 anal body diameter long. Spinneret long, somewhat curved ventrally, 9 μ.

Female. Amphids slightly smaller than male, 3.3 μ wide.

Reproductive system with paired, opposed and reflexed ovaries; the anterior

reflexed at 160 μ and the posterior at 157 μ before and after vulva. Vulva situated slightly before middle of body. Eggs 39–48×33–35 μ (including paratypes), one each uterus.

Tail (Fig. 2–5) longer and slimmer than male, 4.7 anal body diameter long.

Variation. Esophagus bulb sometimes pyriform. Preanal supplements usually four in number, but five ones in one male. The anterior and posterior ovaries reflexed at about 21% of body length at maximum before and after vulva. Spinneret not always bent ventrally, 7–10 μ.

Remarks. The present species resembles *C. brevipapillata japonica* in the following features; the oval or pyriform esophagus bulb, the distally expanded gubernaculum, the distinctive shape of the preanal supplements, the more plumper tail and the long spinneret. Therefore, *C. yamadai*, as well as the former species, belongs to the *C. macrolaimoides*-group (cf. Wieser, 1956, p. 612).

The present species, however, is easily distinguishable from *C. brevipapillata japonica* by the characteristics that the excretory pore stably opens between the pigment spots and nerve ring, about 40% of esophagus length from the anterior head end, and that the number of the preanal supplements is four, rarely five in the male.

Material studied. 26 males and 22 females. 24 ♂♂ and 22 ♀♀ (11–I–1977) as type-series: Shirahama, among algae including *Sargassum*; 1 ♂ (30–III–1977) and 1 ♂ (5–XIII–1977): Tomioka, among algae including *Sargassum*.

The trivial name is in hornor of Professor Mayumi Yamada of Hokkaido University.

Chromadora macrolaimoides Steiner, 1915

(Fig. 3)

Note. See the description of the Japanese specimens by Wieser (1955).

Measurements.

Males (1,2–Shirahama; 3,4–Tomioka; 5,6–Kuroshima): L=625; 739; 684; 798; 664; 691, eso=121; 128; 129; 133; 127; 130, hd=12; 11; 11; 11; 11; 12, bd=27; 27; 23; 26; 24; 24, ad=21; 23; 20; 22; 21; 20, mbd=27; 31; 26; 32; 29; 27, cs=8; 6; 9; 9; 10; —, ps=22; 22; 19; 24; 23; 23, nr=71; 76; 71; 72; 73; 76, ep=15; 18; 17; 17; 20; 20, vg=164; 192; 190; 198; 190; 189, spic=23(21); 24(21); 23(21); 22(20); 24(23); 23(21), gub=15; 19; 17; 19; 19; 17.

Females (1,2–Shirahama; 3,4–Tomioka; 5,6–Kuroshima): L=710; 813; 745; 791; 759; 798, eso=134; 142; 135; 136; 135; 133, hd=10; 11; 11; 11; 12; 11, bd=28; 26; 27; 30; 26; 25, ad=19; 19; 16; 19; 19; 19, vd=38; 32; 29; 35; 35; 31, mbd=38; 32; 32; 37; 35; 33, cs=8; 9; 9; 9; 9; 9, ps=25; 26; 25; 22; 23; 23, nr=76; 83; 76; 76; 73; 75, ep=21; 18; 19; 18; 16; 15, vg=207; 211; 199; 200; 197; 200, t=111; 118; 116; 117; 113; 115, v=352; 384; 357; 378; 369; 379.

Male (♂–2). Head (Fig. 3–2) truncated, cephalic setae injured. Amphids loop-shaped, 3.3 μ wide. Pigment spots distinct. Esophagus bulb (Fig. 3–1) double, 36×20 μ; two constrictions developed. Excretory pore opening slightly

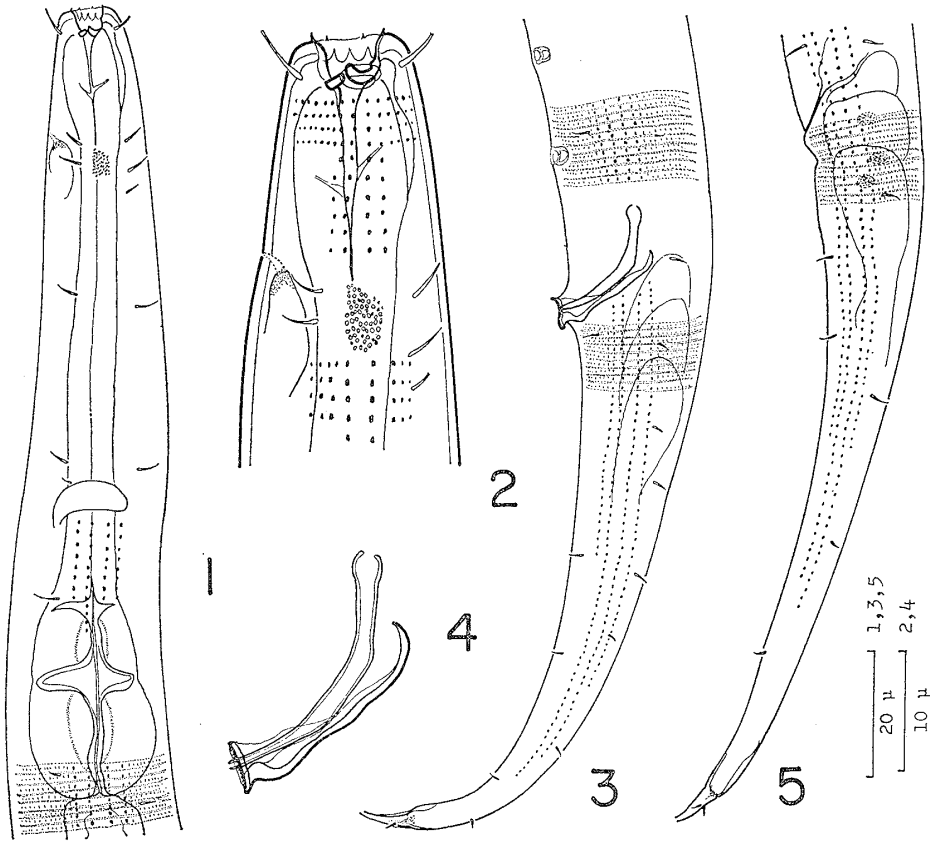

Fig. 3. *Chromadora macrolaimoides* Steiner. Male (♂–2). —— 1. Anterior end. —— 2. Head. —— 3. Posterior end. —— 4. Spicules and gubernaculum. —— 5. Female (♀–2). Tail.

before pigment spots.

Reproductive system with a single outstretched testis, 402 μ from anterior end of testis to cloaca. Spicules (Fig. 3–4) proximally cephalized, proximal third rather straight. Gubernaculum well cuticularized, shorter than spicules; distal part with characteristic lateral expansion, distal edge slightly serrated. Preanal supplements small and rather faint, 2.4×2.5 μ, two in number; distance between two supplements shorter than that between the posteriormost one and cloaca, 16 μ and 25 μ, respectively.

Tail (Fig. 3–3) long and slender, 4.6 anal body diameter long. Spinneret long and distally bent, 9 μ.

Female (♀–2). Reproductive system with paired, opposed and reflexed ovaries; the anterior reflexed at 124 μ, the posterior at 127 μ before and after vulva. One egg present in the posterior uterus, $37–51\times20–25$ μ (including other females).

Tail (Fig. 3–5) longer and slimmer than male, 6.2 anal body diameter long. Spinneret slightly bent, 8 μ.

Variation. No significant morphological difference was observed among the specimens collected from Shirahama, Tomioka, and Kuroshima. Esophagus bulb variable, oval, pyriform or double. The distance between two preanal supplements, and the posteriormost one and cloaca, 20–32 μ and 25–32 μ, respectively. The anterior and posterior ovaries reflexed at about 20% of body length at maximum before and after vulva.

Remarks. The structure of the preanal supplements of the present species is almost the same as that of *C. brevipapillata japonica* and *C. yamadai* but it is apparently different from that of other *Chromadora* species. Wieser and Hopper (1967) described, based upon the specimens from Florida, that they were "rather faint and of the usual cup-like shape but surrounded by an additional cuticular differentiation", and their illustration of the preanal supplements well accords with those of the Japanese specimens.

Material studied. 42 males and 53 females. 5 ♂♂ and 17 ♀♀ (11–I–1977): Shirahama, among algae including *Sargassum*; 2 ♂♂ (30–III–1975), 3 ♂♂ and 8 ♀♀ (5–XII–1977): Tomioka, among algae including *Sargassum*; 34 ♂♂ and 26 ♀♀ (23–XI–1977): Kuroshima, among algae on the coral reef flat.

Chromadora nudicapitata Bastian, 1865

Note. See the measurements and descriptions of the Japanese specimens by Wieser (1955) and Kito (1978).

Chromadora nudicapitata was collected from all the localities examined, and the variation of some characters was observed:

Lateral differentiation of the cuticle; four longitudinal rows of punctations always present but such punctations and their rows are variable in size as well as in distance.

Shape of esophagus bulb; roundish, with one or two constrictions but the anterior one is always faint.

Preanal supplements; their number and arrangement well variable. The following two different patterns were recognized in the distribution of the preanal supplements.

Pattern I. 3–7 usual shape of supplements; distance between adjacent two, and the posteriormost one and cloaca subequal (see Fig. 5–5a).

Pattern II. 3 usual and one minute supplements; distance between the posteriormost usual one and cloaca longer than that between adjacent two, and minute one just before cloaca.

Postanal papillae; an anterior and a posterior pair of minute papillae sometimes invisible, and the former generally observed as a cuticular elevation.

Lateral differentiation of the cuticle was somewhat indistinct in the material from Oshoro, Muroran and Akkeshi, and some minor variations of the shape of the esophagus bulb and postanal papillae were recognized in every material. The distribution of the preanal supplements appeared to be characteristic at each

Table 1
Distribution of the number of preanal supplements in the males of *Chromadora nudicapitata* from the seven localities in Japan.

Locality	Number of preanal supplements						Total
	Pattern I					Pattern II	
	3	4	5	6	7	3+1	
Oshoro	5	41	29	1	—	—	76
Akkeshi	1	13	—	—	—	—	14
Muroran	—	2	—	—	—	—	2
Misaki	—	1	2	—	1	—	4
Shirahama	—	1	18	4	—	33	56
Tomioka	2	1	5	—	—	2	10
Kuroshima	—	—	—	—	—	6	6

locality as shown in Table 1. Pattern I was observed in the materials from six localities except Kuroshima, and the specimens equipped with four supplements were more abundant at Oshoro, Akkeshi and Muroran, while at the other three localities the specimens with five supplements were abundant. Pattern II occurred restrictedly to the populations of Shirahama, Tomioka, and Kuroshima, and especially at Shirahama the specimens of Pattern II dominated those of Pattern I in the number, and all the males from Kuroshima showed Pattern II. Pattern II was observed together with Pattern I in the same collection, and other significant difference was not found between the males of these two patterns, either. Therefore, such difference of the preanal supplements would be ascribable to the polymorphic nature of *C. nudicapitata*. The representation of Pattern II, however, seems to be heterogenous with the variation within Pattern I. The specimens showing Pattern II have been reported from Chile (Wieser, 1954, as *C. micropapillata crucifera*, 2+1 supplements), the Mediterranean (Wieser, 1956), the Red Sea (Gerlach, 1964, as *C. nudicapitata* (*micropapillata*)) and Florida (Hopper and Meyers, 1967), besides Japan (Wieser, 1955).

Material studied. 168 males and 158 females. 4 ♂♂ and 4 ♀♀ (10–VIII–1973), 41 ♂♂ and 4 ♀♀ (7–IX–1973), 31 ♂♂ and 25 ♀♀ (28–III–1974): Oshoro, among *Sargassum confusum*; 14 ♂♂ and 15 ♀♀ (8–VIII–1976): Akkeshi, among *Sargassum*; 2 ♂♂ and 4 ♀♀ (12–IV–1977, Hiruta leg.): Muroran, among *Sargassum*; 4 ♂♂ and 6 ♀♀ (12–IV–1977): Misaki, among *Sargassum*, 56 ♂♂ and 74 ♀♀ (11–I–1977): Shirahama, among algae including *Sargassum*; 1 ♂ and 4 ♀♀ (30–III–1975), 9 ♂♂ and 6 ♀♀ (5–XII–1977): Tomioka, among algae including *Sargassum*; 6 ♂♂ and 16 ♀♀ (23–XI–1977): Kuroshima, among algae on the coral reef flat.

Chromadora heterostomata Kito, 1978

Note. See the measurements and description by Kito (1978).
The present species was collected from Akkeshi besides the type-locality, Oshoro.

The number of the preanal supplements varies from 10 to 15, mainly 12 or 13; 5 males equipped with 10 supplements, 14 with 11, 29 with 12, 36 with 13, 10 with 14 and 2 with 15.

Material studied. 96 males and 77 females. 92 ♂♂ and 75 ♀♀ (28–III–1974): Oshoro, on *Sargassum confusum*; 4 ♂♂ and 2 ♀♀ (19–VII–1977): Akkeshi, among algae.

Discussion

Distribution of the Chromadora *species on the Japanese coasts*

Five species belonging to the genus *Chromadora, C. nudicapitata, C. macrolaimoides, C. heterostomata, C. brevipapillata japonica* and *C. yamadai* occur on the Japanese coasts. One more species, *C. tridenticulata* Platonova, 1971, has been described from Possjet Bay, on the Japan Sea coast of USSR, though it was not found in the present survey.

The localities, where each species was collected, are shown in Fig. 4, and their distribution is briefly summarized in the following, though the localities surveyed are rather scanty and no sampling has been made on the Japan Sea coast of Honshu.

Chromadora nudicapitata, which is well known as a cosmopolitan species, was found in all the localities as was expected, though Pattern I was observed from all

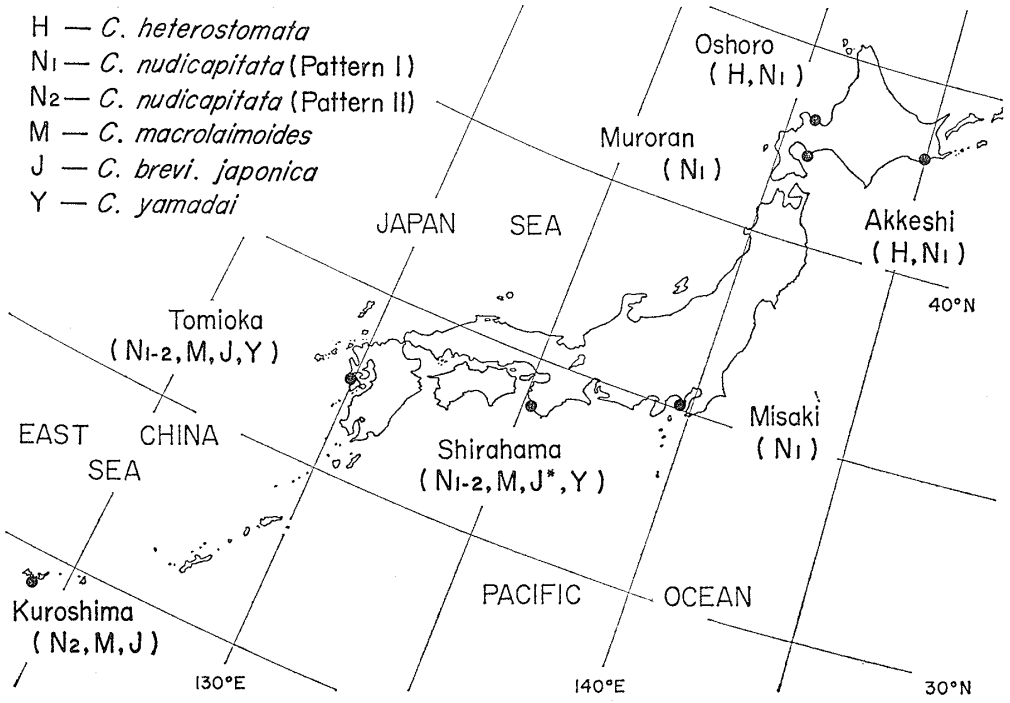

Fig. 4. Localities surveyed and distribution of five species of the *Chromadora* on the Japanese coasts. (J*) at Shirahama is the record as *C. brevipapillata* by Wieser (1955).

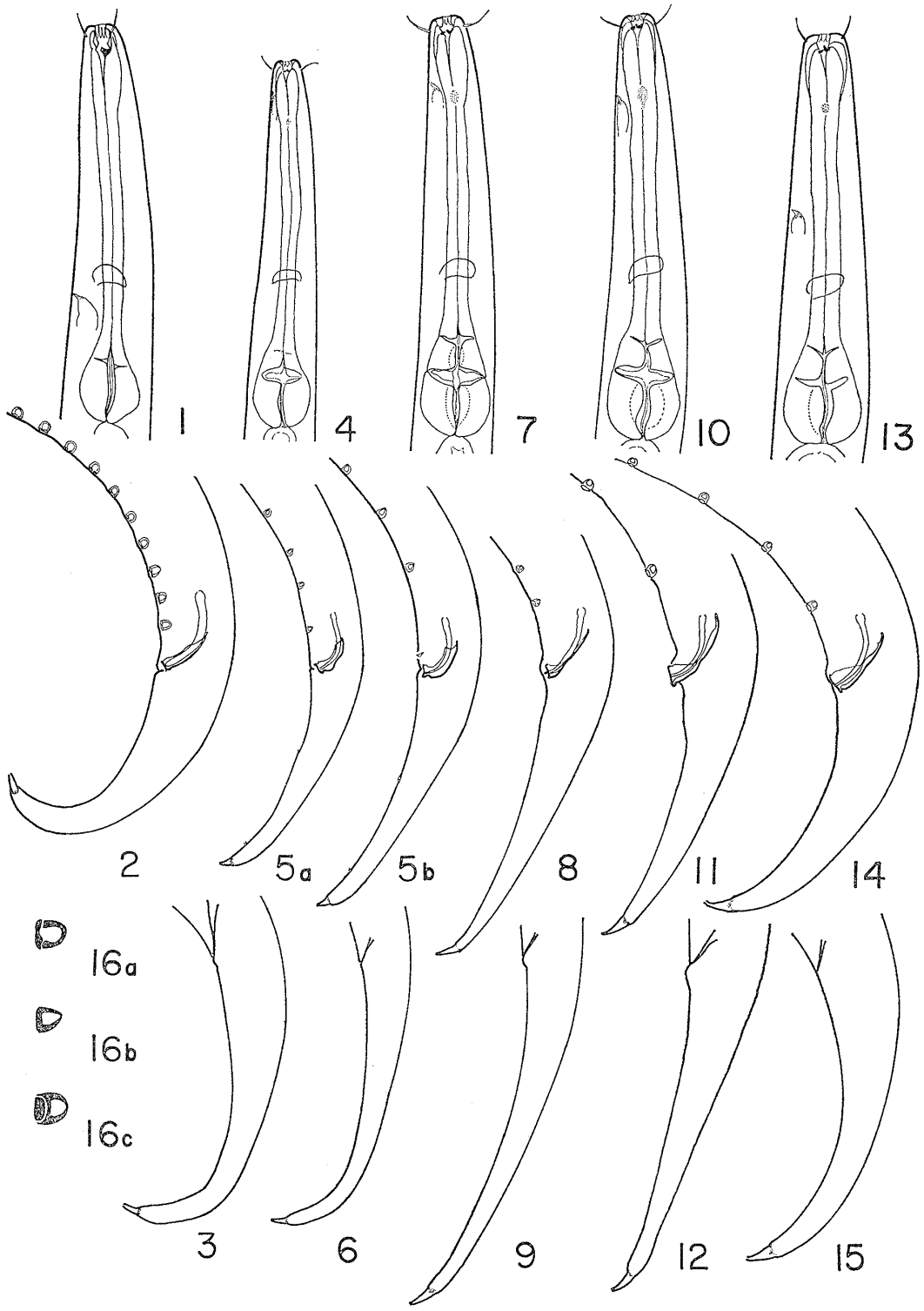

Fig. 5. Comparison of five species of the *Chromadora* from Japan. —— 1–3. *C. heterostomata*. —— 4–6. *C. nudicapitata*: 5a, Pattern I; 5b, Pattern II. —— 7–9. *C. macrolaimoides*. —— 10–12. *C. brevipapillata japonica*. —— 13–15. *C. yamadai*. —— 16. Preanal supplements: a, Type I; b, Type II; c, Type III.

Table 2
Comparison of diagnostic characters among five species of the *Chromadora* from Japan.

Character	*heterostomata*	*nudicapitata*	*macrolaimoides*	*japonica*	*yamadai*
Teeth	large dorsal one conspicuous	subequal	subequal	subequal	subequal
Excretory pore	posterior to nerve ring	near anterior head	just anterior to pigment spots	near but not anterior to pigment spots	more posterior to pigment spots
Esophagus bulb	roundish	roundish	oval, pyriform or double	oval or pyriform	oval or pyriform
Tail[1] ♂	3.7–3.9	3.8–5.2	4.6–5.4	3.4–3.7	3.0–3.7
♀	4.8–5.6	5.6–7.3	5.8–7.3	4.3–4.7	3.7–4.8
Spinneret	5–7 μ	4–5 μ	7–9 μ	8–10 μ	7–10 μ
Spicules	27–32 μ	19–26 μ	22–24 μ	22–24 μ	25–28 μ
Gubernaculum	16–20 μ, with lateral plate	11–20 μ, with lateral plate	15–20 μ, with distal expansion	22–25 μ, with distal expansion	21–25 μ, with distal expansion
Preanal supplements[2]	Type I, 10–16	Type II, small, 3–7 or 3+1	Type III, small and faint, 2	Type III, 2	Type III, 4 rarely 5
Others	lateral projections on buccal walls	postanal papillae			

1) Length in anal body diameters. 2) Types of preanal supplements are shown in Fig. 5–16.

the localities except Kuroshima and Pattern II was only in Shirahama and more southern area. In addition to *C. nudicapitata*, other species, *C. heterostomata* restrictedly occurred in northern Japan, Oshoro and Akkeshi, while the other three species of the *macrolaimoides*-group were distributed in the southern area of Japan. *C. macrolaimoides* and *C. brevipapillata japonica* were recorded from Shirahama (the latter as *C. brevipapillata* by Wieser, 1955), Tomioka and Kuroshima, and *C. yamadai* was from Shirahama and Tomioka. Particularly at Shirahama and Tomioka, four species coexist among the same algal habitat.

Comparison of diagnostic characters

In order to facilitate to distinguish these five species, several available characters are compared, as shown in Table 2 and Fig. 5, based upon my own data. Among these characters the site of the excretory pore appears to be species-specific; *C. heterostomata* — posterior to nerve ring, *C. nudicapitata* — near anterior head, *C. brevipapillata japonica* — near but not anterior to pigment spots, and *C. yamadai* — more posterior to pigment spots. The feature of the excretory pore, however, had better be used together with the other characters for separating each species, because the excretory pore and pigment spots are often indistinct, especially *C. nudicapitata*, probably with the result of preservation.

Chromadora heterostomata characterized by the buccal armatures, especially a large dorsal tooth, is easily distinguishable from the other four species equipped with three subequal teeth. Of the latter four, *C. nudicapitata* possesses the roundish esophagus bulb and short spinneret, so that it differs from three species of the *macrolaimoides*-group with the oval, pyriform or double esophagus bulb and long spinneret. Each species of the *macrolaimoides*-group is clearly definable by the feature of the tail and site of the excretory pore. In addition to these characters, the following ones are also useful to distinguish the males of those species; i.e., the shape of the spicules and gubernaculum, the proportion of their length and, particularly, the structure as well as the number of the preanal supplements. A key to the species within the genus *Chromadora* in Japan, using these characters, is given below.

A. A large dorsal tooth conspicuous ..... *C. heterostomata*
Excretory pore posterior to nerve ring, preanal supplement type I, 10–15 in number.
— Three subequal teeth present ..... B
B. Esophagus bulb roundish, spinneret short ..... *C. nudicapitata*
Excretory pore near anterior head, preanal supplement type II, 3–7 or 3+1 in number.
— Esophagus bulb oval, pyriform or double, spinneret long.....
..... C (the *macrolaimoides*-group)
Gubernaculum distally with characteristic lateral expansion, preanal

supplement type III.

C. Tail slender, 4.6–5.4 ad long in male and 5.8–7.3 in female..... ..... *C. macrolaimoides*
Excretory pore just anterior to pigment spots, preanal supplements small and faint, 2 in number.

— Tail plumper, 3.0–3.7 ad long in male and 3.7–4.8 in female .....D

D. Excretory pore near but not anterior to pigment spots .... *C. brevipapillata japonica*
Gubernaculum rather longer than spicules, preanal supplements 2 in number.

— Excretory pore more posterior to pigment spots .....*C. yamadai*
Gubernaculum shorter than spicules, preanal supplements 4, rarely 5 in number.

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